

26. An electronic device as defined in the claim 21, wherein said cover member is comprised of insulating material, and wherein said substrate, said frame member and said cover member are formed from plate-like members of metal clad laminate.

27. An electronic device as defined in the claim 21, wherein said electronic element stored within said cavity is an optical element, and said cover member for sealing over said cavity is made of transparent material. --

REMARKS

Reconsideration and allowance of this application, as amended, is respectfully requested.

This amendment is in response to the Office Action dated April 1, 2002. Appreciation is expressed to the Examiner for the allowance of claims 8-15 and 20. By the present amendment, new claims 21-27 have been added to further define the invention.

Briefly, in accordance with one aspect of the invention as shown, for example, in the embodiment illustrated in Fig. 1(A)-1(E) and 2(A)-2(C), the present invention is directed to providing an improved electronic device sealing arrangement in which an electronic element (for example, a device such as a flip chip 17) is hermetically sealed within a space formed by an insulating frame 20 and cover 22, as well as an insulating substrate 2. In addition, the insulating substrate is provided with a terminal arrangement in which upper terminals 12 on the insulating substrate 2 (which contact electrode terminals of the electronic element 17) are electrically connected to the outside of the device. In the particular embodiment shown in Figs. 2(B) and 2(C),

side terminals 13 and lower terminals 14 are electrically connected to the upper surface terminal 12 on the insulating substrate. This permits electrical connection between the terminals on the flip chip 17 and the side and bottom terminals 13 and 14 of the semiconductor device 26.

As such, the embodiment shown in Figs. 2(B) and 2(C) permits hermetically sealing electronic elements such as the flip chip 17 within a space defined by the insulating substrate 2, the insulating frame member 20 and the cover 22, without being in direct physical contact with any of these elements to 20 and 22. At the same time, electrical connection is achieved to the outside of the hermetically sealed space by way of the upper surface terminal 12, the side terminal 13 and the lower terminal 14.

Reconsideration and allowance of claims 1, 4 and 6 over Maekawa is respectfully requested. In the Office Action, it is noted that Maekawa provides an arrangement where an electronic element 6 is formed within an area defined by a substrate 3 which extends under and along the sides of the electronic element 6. The Office Action goes on to state that Maekawa also provides:

“a covering member (2) of insulating material, for hermetically sealing over the cavity of said frame member, in which said electronic element is stored.”

It is respectfully submitted that although the material 2 might serve to hermetically seal the electronic element 6, it does so in a manner completely different than that defined by claim 1 and its dependent claims 4 and 6.

More specifically, the numeral 2 in Maekawa designates a potting agent which serves to completely surround and contact the electronic element 6. This is clear from the abstract which states:

“the potting material is poured into the recess portion so as to completely cover the semiconductor chip.”

It is also noted in column 2, lines 13 and 14.

The invention defined by Maekawa is particularly directed to problems which have occurred in the past in filling the potting material 2 to completely seal the electronic element 6. In particular, as described beginning with column 4, line 50, the invention of Maekawa provides a suction opening 13 to assist in placing the potting agent completely around the semiconductor element 6. Therefore, as shown in Figs. 4 and 5, the device of Maekawa includes an opening 13 in the finished device.

Claim 1 of the present application specifically defines:

"a cover member of insulating material, for hermetically sealing over the cavity of said frame member."

In conjunction with this, claim 1 also defines a frame member "having a cavity formed for storing said electronic element therein." As such, it is clear from the claim language that the cover member is formed over the cavity of the frame member, and does not completely fill the cavity member in the manner illustrated in Maekawa.

Indeed, it would be possible to provide the hermetically sealing of the present invention with the opening 13 defined by Maekawa. In other words, Maekawa achieves the hermetically sealing by completely filling the cavity and, in so doing, completely encapsulating the electronic element 6 with the cover member. To do this, he utilizes an opening 13 to fill the potting material 2. This opening 13 remains after the device is completed. In the present invention, on the other hand, the covering member simply serves to seal over the cavity formed by the frame member, rather than completely filling it. Therefore, it is respectfully submitted that independent claim 1 defines an arrangement which is completely different than that shown in Maekawa, and reconsideration and allowance of independent claim 1 and

not
claim 5

its dependent claims 4 and 6 over Maekawa is respectfully requested.

Similarly, reconsideration and allowance of claim 1 and claims 4-7 over Daniels is also respectfully requested. Like Maekawa, Daniels simply provides a material 142 or 242 which completely encapsulates the electronic element 120. Therefore, like Maekawa, Daniels fails to teach the particular arrangement of a cover member for hermetically sealing over the cavity of a frame member. Therefore, reconsideration and allowance of claim 1 and claims 4-7 over Daniels is respectfully requested.

Consideration and allowance of new independent claim 21 and its dependent claims 22-27 over both Maekawa and Daniels is also respectfully requested. Claim 21 also defines an arrangement with an electronic element stored in a cavity formed by a frame member, in conjunction with a substrate, together with a cover member to hermetically seal over the cavity of the frame member. In addition, claim 21 defines:

“wherein said cover member, said frame member and said substrate form a hermetically sealed space in which said electronic element is stored without being in direct physical contact with any of the cover member, the frame member or the substrate.”


As such, claim 21 defines the arrangement such as shown in Fig. 2(B) and 2(C) in which an electronic element such as 17 is hermetically sealed in a space formed by the cover member, the frame member and the substrate without being in direct physical contact with any of these elements. Obviously, the potting material 2 in Maekawa and 142 in Daniels is in direct physical contact with the electronic elements illustrated in these references. Therefore, the resulting structure of claim 21 and its dependent claims 22-27 is completely different than that taught by Maekawa and Daniels. Therefore, allowance of newly presented claims 21-27 over both Maekawa and Daniels is respectfully requested.

If the Examiner believes that there are any other points which may be clarified or otherwise disposed of, either by telephone discussion or by personal interview, the Examiner is invited to contact applicants' undersigned attorney at the number indicated below.

To the extent necessary, the applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli, Terry, Stout & Kraus, Deposit Account No. 01-2135 (520.40395X00).

Respectfully submitted,

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